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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/052,396	01/23/2002	Jean Claude Perrin	Q68039	3942
7590 11/12/2003			EXAMINER	
SUGIRUE MION, PLLC 2100 Pennsylvania Avenue, NW Washington, DC 20037-3213			CHOI, WILLIAM C	
			ART UNIT	PAPER NUMBER
			2873	

DATE MAILED: 11/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/052,396	Applicant(s) PERRIN ET AL.	
	Examiner William C. Choi	Art Unit 2873	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 August 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,5-8 and 10-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,5,6,11,15,16,18,20,22 and 26 is/are rejected.
- 7) ☒ Claim(s) 7,8,10,12-14,17,19,21,23-25 and 27-32 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
 If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input checked="" type="checkbox"/> Interview Summary (PTO-413) Paper No(s). <u>1003</u> . |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: |

DETAILED ACTION

Claim Objections

Claims 27 and 30 (and dependent claims 28, 29, 31 and 32) are objected to because of the following informalities: in line 10 of both claims, applicant discloses wherein, "the refractive power of the mirror group is **high**", which introduces unclarity as to what degree is being referred to. However, for purposes of examination, the amended limitation in reference to "**high**" in claim 1: "**calculated such that a divergent beam incident on the mirror group is transformed into a convergent beam**" was taken to be the assumed meaning. Appropriate correction is required. Dependent claims 28, 29, 31 and 32 inherit the objection from their respective parent claims.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-3, 5, 6, 11, 15, 16, 18, 20, 22 and 26 are rejected under 35 U.S.C. 102(e) as being anticipated by Omura (U.S. 6,208,473 B1).

In regards to claim 1, Omura discloses a catadioptric projection lens for projecting a pattern located on an object plane onto an image plane (column 1, lines 4-22, Figure 1), wherein, between the object plane (column 3, line 7, Figure 1, "12") and the image plane (column 3, line 7, Figure 1, "14"), the following are arranged in the given order: a first objective part, which creates a ray (column 3, line 8, Figure 1, "G1"); a physical beam splitter with a beam splitter surface (column 3, lines 8-9 and 42-47, Figure 1, "20"), whereby the ray created by the first objective part is directed to the physical beam splitter (Figure 1, "16b" & "20"); a mirror group (Figure 1, "G2") receiving light directly from the beam splitter and returning light directly to the beam splitter, the mirror group having a refractive power and a concave mirror (column 3, lines 9-13, Figure 1, "L22"); and a second objective part with positive refractive power, which creates an image of the pattern on the image plane (column 3, lines 31-38, Figure 1, "G3"), wherein the refractive power of the mirror group is calculated such that a divergent beam incident on the mirror group is transformed into a convergent beam (Figure 1, "G3" & "16C") and the system aperture is located imagewise behind the concave mirror (column 3, lines 39-41, Figure 1, "AS").

Regarding claim 2, Omura discloses wherein the system aperture is located between the beam splitter surface and the image plane (column 3, lines 39-41, Figure 1, "AS").

Regarding claim 3, Omura discloses wherein the system aperture is located close to the rear exit surface of the beam splitter (column 3, lines 39-41, Figure 1, "AS").

Regarding claim 5, the refractive power of the mirror groups of Omura would inherently be calculated such that the sum of the absolute values of the peripheral ray angles of beams incident on and exiting from the mirror group are much larger than zero, this being reasonably assumed from the rays incident on and exiting from the mirror group disclosed in Figure 1.

Regarding claim 6, Omura discloses wherein the first objective part is designed for creating a divergent beam directed to the beam splitter (Figure 1, "G1" & "16a").

Regarding claim 11, the absolute value of the peripheral ray angle of the rays arriving at the mirror group would inherently be larger than that of the rays emitted from the mirror group of Omura, this being reasonably assumed from the ray diagrams disclosed in the beam splitter ("20") of Figure 1.

Regarding claim 15, Omura discloses wherein the second objective part is constructed in the manner of a retro focus objective, with at least one lens with negative refractive power between the beam splitter and the rear lenses with a total positive refractive power (Figure 1, "G3")

Regarding claim 16, Omura discloses wherein the beam splitter surface is arranged in a beam splitter serving as a supporting body (column 3, lines 8-9 and 42-47, Figure 1, "20") and the system aperture is positioned outside of the beam splitter (column 3, lines 39-41, Figure 1, "AS").

Regarding claim 18, Omura discloses wherein the beam splitter surface is a polarizing beam splitter surface (column 3, lines 46-47) and a quarter waveplate is

positioned between the beam splitter surface and the concave mirror (column 3, line 66 – column 4, line 4).

Regarding claim 20, Omura discloses wherein the second objective part contains no correction means with a first and second lens material of different dispersion for correcting chromatic aberration (column 3, lines 31-40, Figure 1, "G3").

Regarding claim 22, Omura discloses wherein the projection lens is constructed such that the pattern is projected onto the image plane without creating an intermediate image (Figure 1, "16a-16c").

In regards to claim 26, Omura discloses a method for manufacturing semiconductor devices and other microdevices (column 1, lines 9-22) with the following steps: providing a mask with a given pattern (column 1, line 12-13); illuminating the mask with ultraviolet light of a given wavelength (column 1, lines 12-14); and projecting an image of the pattern on a photosensitive substrate located in the area of the image plane of the projection lens (column 1, lines 14-17) with the help of a catadioptric projection lens comprising, a first objective part, which creates a ray (column 3, line 8, Figure 1, "G1"); a physical beam splitter with a beam splitter surface (column 3, lines 8-9 and 42-47, Figure 1, "20"), and to which the ray is directed (Figure 1, "16b" & "20"); a mirror group (Figure 1, "G2") receiving light directly from the beam splitter and returning light directly to the beam splitter, the mirror group having a refractive power and a concave mirror (column 3, lines 9-13, Figure 1, "L22"); and a second objective part with positive refractive power, which creates an image of the pattern on the image plane (column 3, lines 31-38, Figure 1, "G3"), wherein the refractive power of the mirror group

is calculated such that a divergent beam incident on the mirror group is transformed into a convergent beam (Figure 1, "G3" & "16C") and the system aperture is located imagewise behind the concave mirror (column 3, lines 39-41, Figure 1, "AS").

Allowable Subject Matter

Claims 27-32 would be allowable if rewritten or amended to overcome the objection, set forth in this Office action.

The following is a statement of reasons for the indication of allowable subject matter: The prior art fails to teach a combination of all the claimed features as presented in claims 27-29: a catadioptric projection lens as claimed specifically wherein the beam splitter surface is positioned in a beam splitter block that has an optical minimal shape other than cubic shape, and wherein the maximum radiated material volume is more than 70% of the outer volume of the beam splitter block.

The prior art fails to teach a combination of all the claimed features as presented in claims 30-32: a catadioptric projection lens as claimed specifically wherein the image side numerical aperture is more than approx. 0.7.

Claims 7, 8, 10, 12-14, 17, 19, 21 and 23-25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The prior art fails to teach a combination of all the claimed features as presented in claim 7: a catadioptric projection lens as claimed, specifically wherein the first

objective part is designed such that an exiting divergent beam has a minimum peripheral ray angle of more than 20% of the image side numerical aperture of the projection lens.

The prior art fails to teach a combination of all the claimed features as presented in claim 8: a catadioptric projection lens as claimed, specifically wherein the first objective part in front of the beam splitter has a negative refractive power adapted to create a waist section in the ray trajectory.

The prior art fails to teach a combination of all the claimed features as presented in claim 10: a catadioptric projection lens as claimed, specifically wherein the beam exiting on the image side of the mirror group has a peripheral ray angle of more than 10% of the image side numerical aperture.

The prior art fails to teach a combination of all the claimed features as presented in claim 12: a catadioptric projection lens as claimed, specifically wherein no free-standing lens is placed between the beam splitter surface and the concave mirror.

The prior art fails to teach a combination of all the claimed features as presented in claim 13: a catadioptric projection lens as claimed, specifically wherein the concave mirror has a positive magnification.

The prior art fails to teach a combination of all the claimed features as presented in claim 14: a catadioptric projection lens as claimed, specifically wherein the first objective part contains a second lens group between the deviating mirror and the beam splitter.

The prior art fails to teach a combination of all the claimed features as presented in claim 17: a catadioptric projection lens as claimed, specifically wherein the beam splitter surface is positioned in a beam splitter block that has an optical minimal shape other than cubic shape, and wherein the maximum radiated material volume is more than 70% of the outer volume of the beam splitter block.

The prior art fails to teach a combination of all the claimed features as presented in claim 19: a catadioptric projection lens as claimed, specifically wherein all transparent optical components are made of the same material.

The prior art fails to teach a combination of all the claimed features as presented in claim 21: a catadioptric projection lens as claimed, specifically wherein the image side numerical aperture is more than approx. 0.7.

The prior art fails to teach a combination of all the claimed features as presented in claim 23: a catadioptric projection lens as claimed, specifically wherein the sine of the maximum beam angle at a refracting surface for all surfaces, with the exception of a maximum of three most imagewise surfaces, is less than 80% of the image side numerical aperture.

The prior art fails to teach a combination of all the claimed features as presented in claim 24: a catadioptric projection lens as claimed, specifically comprising at least one optical component with at least one aspherical surface.

The prior art fails to teach a combination of all the claimed features as presented in claim 25: a catadioptric projection lens as claimed, specifically wherein at least one aspherical surface is positioned in the area of the system aperture and at least one

aspherical surface is positioned in the area of at least one of the object plane and the image plane.

Prior Art Citations

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Omura (6,512,641 B2) and Ishiyama et al (U.S. 5,694,241) are being cited herein to show catadioptric projection lenses comprising structural limitations of that of the claimed invention. However, additional rejections would have been repetitive.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of


the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William C. Choi whose telephone number is (703) 305-3100. The examiner can normally be reached on Monday-Friday from about 9:00 am to 6 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Y. Epps can be reached on (703) 308-4883. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

W.C.
William Choi
Patent Examiner
Art Unit 2873
October 27, 2003


Georgia Epps
Supervisory Patent Examiner
Technology Center 2800